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Journal of the Society of Arts.

FRIDAY, OCTOBER 4, 1867.

Announcements by the Council.

ARTIZANS' VISITS TO PARIS.

Her Majesty's Government have transmitted to the Society of Arts, in aid of the fund raised by the Society for assisting workmen, specially selected from various trades, to visit and report on the Paris Exhibition, the sum of £500, which was granted conditionally on the Society raising a like amount by public subscription.

The amount received up to the present time is as follows:—

| | | | | |
|------------------------------------------------|--------|----|---------|-------------|
| H.R.H. THE PRINCE OF WALES, President | £31 | 10 | 0 | } £518 14 0 |
| Society of Arts | 105 | 0 | 0 | |
| Other Subscriptions already published | 382 | 4 | 0 | |
| Jacob Brett | .. | .. | 2 2 0 | |
| HER MAJESTY'S GOVERNMENT.. | .. | .. | 500 0 0 | |
| Total | £1,020 | 16 | 0 | |

Subscriptions may be forwarded to the Financial Officer, at the Society's House.

PRIZES FOR ART-WORKMEN.*

The Council of the Society of Arts hereby offer Prizes for Art-Workmanship, according to the following conditions:—

I. The works to be executed will be the property of the producers, but will be retained for exhibition, in London and elsewhere, for such length of time as the Council may think desirable.

II. The exhibitors are required to state in each case the price at which their works may be sold, or, if sold previously to exhibition, at what price they would be willing to produce a copy.

III. The awards in each class will be made, and the sums specified in each class will be paid, provided the works be considered of sufficient merit to deserve the payment; and, further, in cases of extraordinary merit additional awards will be given, accompanied with the medal of the Society.

IV. Before the award of prizes is confirmed, the candidates must be prepared to execute some piece of work sufficient to satisfy the Council of their competency.

V. *Bona-fide* Art-workmen only can receive prizes.

VI. Although great care will be taken of articles sent for exhibition, the Council will not be responsible for any accident or damage of any kind occurring at any time.

VII. Prices may be attached to articles exhibited and sales made, and no charge will be made in respect of any such sales.

VIII. All the prizes are open to male and female competitors, and in addition, as regards Painting on Porcelain,

* The Worshipful Company of Salters contribute £10 annually to this prize fund. The Worshipful Company of Clothworkers contribute £10 10s. to this prize fund. The Worshipful Company of Goldsmiths contribute £15 "for the encouragement of workmen in the precious metals." Particulars of the Goldsmiths' Company's prizes are given. The North London Exhibition prize consists of the interest of £167 7s. 3d., invested in the name of the Society of Arts, to be awarded by the Council "for the best specimens of skilled workmanship" at the Society's Exhibition of the works sent in for the prizes named above.

Cameo-cutting, Engraving on Glass, Decorative Painting, and Wall Mosaics, a second set of prizes, of the same amounts, will be awarded among female competitors. If a female desire to compete in the female class only, she must declare her intention accordingly. The originals of the works prescribed may be seen at the South Kensington Museum.

IX. Any producer will be at liberty to exhibit, either in his own name or through his workmen, any work or works as specimens of good workmanship, in the various classes, provided that the work or works be accompanied with a statement of the name or names of the artizans who executed their respective portions; and if the work or works be sufficiently meritorious, extra prizes will be given to the artizans who have executed them.

X. Artizans may, if they think fit, exhibit works executed by them after other designs than those stated above, in any of the classes. Such works may contain the whole or portions of the prescribed designs, and must be of a similar style and character. Competitors must specify the class in which they exhibit. If the works be sufficiently meritorious extra prizes will be awarded.

XI. All articles for competition must be sent in to the Society's house on or before Saturday, the 21st of December, 1867, and must be delivered free of all charges. Each work sent in competition for a Prize must be marked with the Art-workman's name, or, if preferred, with a cypher, accompanied by a sealed envelope giving the name and address of the Art-workman. With the articles, a description for insertion in the catalogue should be sent. The works will be exhibited at the Society's House, and afterwards at the South Kensington Museum.

Casts may be seen at the Society of Arts, Adelphi, London, and the Schools of Art at Edinburgh, Dublin, Manchester, Glasgow, Birmingham, and Hanley in the Potteries.

Photographs and rough casts in metal, &c., may be purchased at the Society of Arts, John-street, Adelphi, at the prices named.

The plaster casts of the examples in classes 2 and 4 (except bas-relief 4a) may be obtained from Mr. Franchi, 15, Myddelton-street, Clerkenwell, E.C.; the other casts from Mr. D. Brucciani, Galleria delle Arti, 40, Russell-street, Covent-garden, W.C.

* * The Council are happy to announce that several of the works which received first prizes in the competitions of 1863, 1864, 1865, 1866, and 1867, have been purchased by the Department of Science and Art, to be exhibited in the South Kensington Museum and the Art Schools in the United Kingdom.

FIRST DIVISION.

WORKS TO BE EXECUTED FROM PRESCRIBED DESIGNS.

For the successful rendering of the undermentioned designs in the various modes of workmanship according to the directions given in each case.

CLASS 1.—CARVING IN MARBLE, STONE, OR WOOD.

(a.) *The Human Figure*.—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work executed in marble or stone, after part of a frieze of a chimney-piece, by *Donatello*, No. 5,795, in the South Kensington Museum; or a relievo in terra cotta, *Amorini* supporting an entablature; original in the South Kensington Museum, No. 11,940. Dimensions—Two-thirds the size of the cast (linear).—The design may be adhered to strictly or adapted to any architectural purpose.

[Cast—Fifteen Shillings; Photograph—One Shilling.]

(b.) *Ornament*.—One prize of £10 for the best, and a second prize of £5 for the next best work, executed in marble, stone, or wood after a carved chair-back in the South Kensington Museum. Dimensions—To be two-thirds of the cast (linear).

[Cast—Twelve Shillings; Photograph—One Shilling.]

(c.) *Ornament*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in stone, after a *Gothic bracket* in the Architectural Museum. Dimensions the same as the cast. In this design the details may be improved by the introduction of small animals, and the human head may be changed according to the taste of the art-workman.

[Cast—Ten Shillings; Photograph—One Shilling.]

(d.)—One prize of £20 for the best, and a second prize of £10 for the next best, work carved in wood after a panel in carved oak. Original in South Kensington Museum, No. 274. Dimensions—Optional.

[Photograph—Sixpence.]

(e.)—One prize of £15 for the best, and a second prize of £7 10s. for the next best, work carved in wood after the entablature of a chimney-piece carved in wood, in the South Kensington Museum, No. 85'64. Dimensions—Same size as original.

[Photograph—One Shilling.]

(f.) *Ornament*.—One prize of £10 for the best, and a second prize of £5 for the next best, work carved in wood after an *Italian picture frame* in the possession of Henry Vaughan, Esq. Dimensions optional.—This design may be adhered to strictly or adapted in such manner as the workman may think fit.

[Photograph—Two Shillings.]

(g.) *Ornament carved and gilt*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed in wood, carved and gilt after a *Console Table* in the South Kensington Museum, No. 6,497, of the period of Louis XVI. The work to be carved roughly in wood, then to be prepared in the white by a gilder, then cut up or carved in the white by the carver, then to be gilt in mat and burnished gold. As such work may probably be executed by two persons, the prize will be apportioned as the judges may determine.

[Photograph—One Shilling.]

CLASS 2.—REPOUSSÉ WORK IN ANY METAL.

(a.) *The Human Figure as a bas-relief*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after the Martelli Bronze Mirror Case, No. 8,717, in the South Kensington Museum—dimensions, 6½ inches diameter; or a panel in low relief, the Virgin and Child, in South Kensington Museum, No. 66'66. Dimensions—One-third of original.

[Cast of Mirror Case—Two Shillings; Photograph—One Shilling. Cast of Bas-relief, 3s. 6d.]

(b.) *Ornament*.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a *tazza* in silver, date 1683, the property of Sir W. C. Trevelyan, Bart., now in the South Kensington Museum. Dimensions—The same as the model.

[Photograph—One Shilling.]

CLASS 3.—HAMMERED WORK, IN IRON, BRASS, OR COPPER.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after a knocker in wrought iron, in the South Kensington Museum, No. 9,007.

If the work is executed in brass or copper, it should be rendered subject to the conditions of these metals, either as split and riveted or partly beaten from the sheet, and the awards will be made in view of these conditions. The work must not be covered with colour or any coating which masks the workmanship.

[Photograph—One Shilling and Threepence.]

CLASS 4.—CARVING IN IVORY.

(a.) *Human Figure in the round*.—One prize of £15 for the best, and a second prize of £10 for the next best, work executed after an ivory plaque of Silenus and Amorini, by *Fiamingo*, No. 1,059, in the South Kensington Museum; dimensions—five inches greatest length; or after a relief in marble, the Virgin and Child, No. 4,233 in the South Kensington Museum. Dimensions—To be reduced in height by one-third (linear).

[Cast of the Plaque—Two Shillings; and Photograph of the Virgin and Child—One Shilling each.]

(b.) *Ornament*.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an ivory crozier head, in the South Kensington Museum, No. 214'65. Dimensions—The same as the cast.

[Cast—One Shilling.]

CLASS 5.—CHASING IN BRONZE.

(a.) *The Human Figure*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66'66.

A rough casting in bronze, on which the chasing must be executed, will be supplied by the Society at cost price.

[Plaster Cast—Three Shillings and Sixpence.]

(b.) *Ornament*.—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a silver gilt missal cover, in the South Kensington Museum, No. 2,639.

[Photograph—One Shilling.]

CLASS 6.—ETCHING AND ENGRAVING ON METAL—NIELLO WORK.

Prizes of the Goldsmiths' Company.

Ornament.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1523. No. 18,968 in the South Kensington Museum. To be engraved the height of the photograph, and, if round a cup or goblet, repeated so as to be not less than nine inches in length when stretched out.

[Photograph—Sixpence.]

CLASS 7.—ENAMEL PAINTING ON COPPER OR GOLD.

(a.) *The Human Figure*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a panel in low relief, the Virgin and Child, in the South Kensington Museum, No. 66'66. Ground to be blue. Dimensions—Half size of original.

[Photograph—One Shilling; Cast, Three Shillings and Sixpence.]

(b.) *Ornament*.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after the back of a plate, No. 8,428, in the South Kensington Museum. Ground to be blue. Dimensions—The same as the Photograph.

[Photograph—Sixpence.]

CLASS 8.—PAINTING ON PORCELAIN.

(a.) *The Human Figure*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a photograph of a drawing by *Raphael*, No. 20 in the South Kensington Museum. Dimensions—The same as the Photograph. This work is to be coloured according to the taste of the painter.

[Photograph—Ninepence.]

(b.) *Ornament*.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a photograph of ornament by *Aldgrever*, No. 2,118 in the South Kensington Museum, and coloured according to the taste of the painter, with a gold ground. Dimensions—Double the size of the Photograph (linear).

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 9.—DECORATIVE PAINTING.

(a.) *Ornament*.—One prize of £5, and a second prize of £3, for a work, executed after a photograph of ornament by *Aldgrever*, in the South Kensington Museum, No. 2,118. Dimensions—length, 3 feet.

[Photograph—One Shilling.]

(b.) *Ornament*.—One prize of £5, and a second prize of £3, for a work, executed after a *picture frame*, in the South Kensington Museum, No. 7,820. Dimensions—5 feet by 3 feet 11½ inches, outside measure. The works to be executed on canvass, either with or without stretchers, in cool colours. Some lines of the mouldings may be gilt.

[Photograph—One Shilling and Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 10.—INLAYS IN WOOD (MARQUETRY, OR BUEHL), IVORY OR METAL.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed after a guitar inlaid with ivory, ebony, and mother-o'-pearl. The ornament to be of the same dimensions as the original, but may be applied to any object. No. 9,611 in the South Kensington Museum.

[Photograph—Sixpence.]

CLASS 11.—CAMEO CUTTING.

(a.) *Human Head*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a bust of *Clytie* in the British Museum—The head only.

[Cast of the Head—Five Shillings.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VII.

CLASS 12.—ENGRAVING ON GLASS.

Ornament.—One prize of £10 for the best, and a second prize of £3 for the next best, work executed after arabesques by Lucas Van Leyden, A.D. 1528. No. 18,968 in the South Kensington Museum. To be engraved the height of the engraving; and if round a glass or goblet, repeated so as not to be less than 9 inches long when stretched out.

[Photograph—Sixpence.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 13.—WALL MOSAICS.

Human Head.—One prize of £10 for the best, and a second prize of £7 10s. for the next best, work executed after a *Female Head* (over the lame cripple) in the cartoon of the "Beautiful Gate." The dimensions of the work should be regulated by the size of the tesserae proposed to be used, which size may be left to the choice of the artist. Although desirable, it is not necessary to execute the whole subject in actual mosaic. The original is at the South Kensington Museum. Tesserae of two sizes may be obtained from Messrs. Minton, Stoke-upon-Trent;

Messrs. Maw and Co., Broseley, Shropshire; Messrs. Powell and Sons, Temple-street, Whitefriars; and Messrs. Jesse Rust and Co., Carlisle-street, Lambeth.

[Photograph—One Shilling.]

N.B.—A second set of prizes of the same amount is offered to female competitors. See conditions, Section VIII.

CLASS 14.—GEM ENGRAVING.

(a.) *Human Head*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a cameo portrait of Savonarola, No. 7,541 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

(b.) *Full-length Figure*.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a small Wedgwood medallion, No. 5,827 in the South Kensington Museum. Dimensions—The same as the cast.

[Cast—Sixpence.]

CLASS 15.—DIE SINKING.

Full-length Figure.—One prize of £10 for the best, and a second prize of £5 for the next best, work executed after a Wedgwood Medallion in the South Kensington Museum, No. 3,470. Dimensions—The same as the photograph.

[Cast—Sixpence; Photograph—Sixpence.]

CLASS 16.—GLASS BLOWING.

Ornament.—One prize of £7 10s. for the best, and a second prize of £5 for the next best, work executed after an original in the South Kensington Museum, No. 6,785. Dimensions—As given in the wood engraving.

[Photograph—Sixpence.]

CLASS 17.—BOOKBINDING.

(a.) *Bookbinding*.—One prize of £7 10s. for the best and a second prize of £5 for the next best, work executed in bookbinding, after a specimen in the South Kensington Museum, No. 164.'64. The work to be bound should be some classical author of the size given. Dimensions—The same as the photograph.

[Photograph—One Shilling.]

CLASS 18.—EMBROIDERY.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, work executed, either after *Two Angels* in an example in the South Kensington Museum, No. 1194.'64, or an Italian Silk in the South Kensington Museum, No. 7,468, which may be adapted to a screen. Dimensions—According to the taste of the embroiderer.

[Photograph—German, Sixpence; Italian, One Shilling.]

CLASS 19.—ILLUMINATIONS.

Ornament.—One prize of £5 for the best, and a second prize of £3 for the next best, copy made from an Altar Card, attributed to Giulio Clovio, in the South Kensington Museum, No. 2,958, or from a MS. border, date 1450, No. 3,057, in the South Kensington Museum. Dimensions—One-half larger than the Photograph (linear).

[Photograph—Two Shillings.]

SECOND DIVISION.

CLASS 20.—WOOD CARVING.

(a.) *Human figure in the round, in alto or in bas relief. Animals or natural foliage may be used as accessories.* 1st prize of £25 and the Society's Silver Medal. 2nd prize of £15. 3rd prize of £10.

(b.) *Animal or still-life. Fruit, flowers, or natural foliage may be used as accessories.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(c.) *Natural foliage, fruit, or flowers, or conventional ornament, in which grotesque figures or animals may form accessories, preference being given where the work is of an applied character for ordinary decorative purposes, as representing commercial value.* 1st prize of £10. 2nd prize of £7 10s. 3rd prize of £5.

(By order)

P. LE NEVE FOSTER, *Secretary.*

Proceedings of Institutions.

HUDDERSFIELD MECHANICS INSTITUTION.—The twenty-sixth annual report says that the results of the past year have been most encouraging. The classes have all been very well attended; and that the instruction given is valuable has been satisfactorily proved, for some of the old pupils are at work with the principal manufacturers and tradesmen of the town, not employed as mechanics and workmen, but in places of trust, which they have attained by their intelligence and good conduct. The number of members in 1866 was 1,266, against 1,089 in 1865. The receipts from the pupils were, in 1865, £321 7s. 8d.; in 1866, £341 12s. 1d. The annual subscriptions were, in 1865, £301 7s.; in 1866, £317 2s. The average weekly class attendance was, in 1865, 1,050; and, in 1866, 1,265. Upwards of 270 vols. have been added to the library during the year, which is now open every night except Monday, and contains 4,400 volumes. The issues in 1865 were 7,289, and in 1866, 8,660 volumes. The fortnightly meetings have done a great amount of good, and there is no reason to doubt the continuance of their popularity. They consist of singing and instrumental music; lectures of a useful and practical character; readings, serious or humorous, all gratuitously given. The penny bank continues to take a quiet and important part in the social advancement of the people of the locality. The number of depositors in 1865 was 14,770; in 1866, 15,637. The amount of deposits in 1865, £1,975 9s. 8½d.; and in 1866, £2,205 14s. 4½d. There are 107 classes, taught by 19 paid and 15 voluntary teachers. Many of those who take part in the instruction of the pupils are professional teachers of long standing. As a whole, the Committee consider that this is the most valuable department of the Institution. Besides the primary elements of instruction, reading, writing, and arithmetic, the pupils have the opportunity of learning the elements of geography, grammar, history, arithmetic, algebra, and bookkeeping. The most popular subjects are writing and arithmetic. For many years the absense of punctuality in the attendance of the boys has been a source of deep regret. In September, 1866, the Committee, in order to induce the boys to attend the classes regularly, determined to present prizes to all the junior pupils who should attend punctually seventy nights during six months, and have given satisfaction to the teachers during that period, and to those who attend eighty-five nights punctually a superior prize. The success of the scheme bids fair to exceed the highest expectations. Since its commencement, the weekly average attendance has been 1,619; while for the same time last year the weekly average attendance was 1,098. This greatly increased attendance has necessitated the fitting up of two additional class-rooms for the junior pupils. The Committee, mindful of the distances many of the pupils had to walk to reach the Institution, and the early hour at which all the operative class must be astir in the morning, determined on closing the class-rooms half an hour earlier—at nine o'clock, instead of at half-past nine. It is hoped that the change will lead to more concentrated work in the classes. The drawing classes are open every night. The course of

study is drawing and shading from copies, mechanical drawing, linear and practical geometry. A water-colour drawing class is held on Saturday afternoons, which is well attended. The chemical classes continue to flourish. At the examinations connected with the Department of Science and Art several prizes were taken by the students. The utility and importance of the loom class appear to be fully appreciated. The room is nearly always filled with earnest students, anxious to acquire a practical knowledge suited to the trade of the district. The book-keeping class is very popular, but the French class was not so numerously attended during the summer months. In order to make the class somewhat more attractive, a French conversation class was commenced, and is held every Wednesday evening, free of charge to all the pupils of the general class. In August last year an excursion to Wharfedale took place, when about 600 members and friends were present. The Secretary of State for India has presented to the Institution one of the sets of eighteen volumes containing specimens of the cotton, silk, and woollen textile fabrics of native Indian manufacture. Only thirteen sets were distributed in Great Britain. The Committee have provided for easy access to it on the part of all persons practically interested in its inspection. The receipts have been £866 18s. 5d.; and there is a balance in hand of £15 5s. 2d.

EXAMINATION PAPERS, 1867.

The following are the Examination papers set in the various subjects at the Final Examination held in April last:—

(Concluded from page 686.)

GEOMETRICAL DRAWING.

THREE HOURS ALLOWED.

I.

1. Construct a six-sided figure, A B C . . . A (O being a point within it) from the following conditions:—

| Sides, &c. | Angles. |
|---------------|-----------|
| OA = 2 inches | AOB = 50° |
| OC = 1·65 " | BAO = 70° |
| CD = 1·8 " | BCO = 90° |
| OE = 1·8 " | COD = 60° |
| OF = 1·65 " | DOE = 90° |
| | EOF = AOF |

2. On one side of a given line, A B, of 1·5 inches, construct an equilateral triangle, a pentagon, and a heptagon. On the other side of the same line construct a square, a hexagon, and octagon.

3. Describe a circle of 1·25 inches radius, and outside of it six equal circles, each touching the first and the two adjacent circles.

II.

Divide a line A B, 3·75 inches long, into segments, with the following conditions:—

1. In a point C, so that $A B \cdot B C = 3$ square inches.
2. Either internally or externally in C, so that $A B \cdot B C = A C^2$ or $A C \cdot B C = A B^2$.
3. In two points C, D, so that $A C \cdot B D = A B \cdot C D$, A C being assumed at pleasure.

III.

Construct a triangle from the following conditions:—

1. The sum of the sides (perimeter) = 8 inches, and its angles, 40°, 60°, 80°.
2. Its sides in the ratio 2 : 2·5 : 3, and its area 5 square inches.
3. Its sides as 3 : 4 : 5, and the radius of the circumscribing circle 1·5 inches.

IV.

A triangle has its sides 3, 3·5, 4 inches.

1. Construct a square equal to this triangle in area.
2. Construct a rectangle equal to it in area, but the ratio of the sides as 2 : 3.
3. Bisect this triangle by a line parallel to the shortest side.

v.

A circle of 1 inch radius and a line 2 inches from its centre being given—

1. Describe a circle of 1 inch radius to touch both.
2. Describe a circle to touch both, but the *line* in a point 3 inches from the centre of the given circle.
3. Describe a circle to touch both, but to touch the given *circle* in a point 2·25 inches from the line.

SOLID GEOMETRY.

VI.

A square A B C D, of 2 inches side, is to be represented in plan and elevation from the following conditions:—

1. When three of its corners are 1, 1.5, 2.5 inches above the paper.
2. When its plane is inclined at 50° and the side A B is inclined at 20° .
3. When its two diagonals are inclined at 20° and 35° .
(In each case the "ground line" of the elevation to be taken parallel to the shortest side of the plan.)

VII.

A prism four inches long, with a pentagon A B C D E of 1 inch side for its base, is to be represented by a plan and elevation from the following conditions:—

1. When its long edges are inclined at 55° to the paper and one side A B of its base is inclined at 20° .
2. When a line drawn from one corner A of one end to the opposite corner D of the other pentagon is either vertical or horizontal.
3. When the solid is suspended in the air by the corner A.

(In the 1st and 2nd cases the "ground line" of the elevation to be taken parallel to the plan of that line the position of which is given in the question.)

VIII.

A pyramid of the same height, and with a similar base to that of the preceding prism, is to be represented in plan and elevation from the following conditions:—

1. When one long edge is either vertical or horizontal.
2. When the solid is suspended from one corner A of the base.
3. The top of the pyramid being cut off by a plane bisecting one long edge at right angles, the bottom frustum to be represented when resting on the section.

IX.

A cylinder and a cone, each four inches high, their bases being circles of one inch radius, and a sphere of one inch radius, are to be represented, by plan and elevation, in one of the following positions:—

1. The cone standing on its base, the cylinder lying on its side, and the sphere also resting on the paper, each solid touching the other two.
2. The cone lying on its slant side, the cylinder standing on its base, and touching the cone in a point halfway between the vertex and the base.
3. The cone lying on its slant side, the sphere also resting on the paper and touching the cone in any point at pleasure.

X.

1. A sphere of 1.25 inches radius has its centre three inches above the paper. Determine its shadow on the horizontal plane when the light is inclined at 60° .
2. The cone of the preceding questions, lying on its side on the paper; determine a plane tangential to its surface, but inclined at 60° .
3. The axis of the cylinder being inclined at 35° , determine by its plan and elevation a line inclined to the paper at 60° , and touching the surface in one point.

N.B.—To entitle the candidate to a first-class certificate, he must construct two at least of the questions of the Solid Geometry.

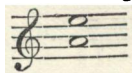
THEORY OF MUSIC.

THREE HOURS ALLOWED.

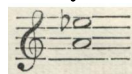
RUDIMENTS OF MUSICAL GRAMMAR.

(Nos. 5, 6, 7, and 8 must be answered on music paper.)

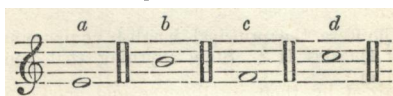
1. In what scales is the following?



2. In what major scale only is the following? and why?



3. Explain the following words—*syncopation*, *inversion*, *transposition*.
4. What is meant by a chromatic scale?
5. Add a major second to *a*, a major third to *b*, a perfect fourth to *c*, and an imperfect fifth to *d*.



6. Write the scale of *Sol* (G) minor in every form with which you are acquainted.
7. Put time signatures to the following:—

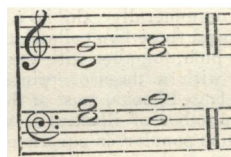


8. Give an example of an augmented second, of a diminished third, a diminished fourth, an augmented fifth, an augmented sixth, and a diminished seventh.

HARMONY, COUNTERPOINT, AND MUSICAL HISTORY.

(Nos. 6, 7, and 8 must be answered on music paper.)

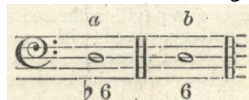
1. What objection is there to the use of the 7th of a major scale as a root, and under what circumstances can it be so used?
2. Give a reason, founded on the laws of harmony, for the elevation, by a semitone, of the 7th of a minor scale.
3. What objection is there to the following progression, and what are the difficulties attending the arrangement of the accompanying parts?



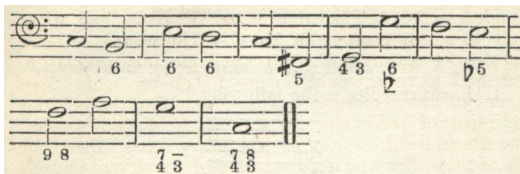
4. Point out the errors or imperfections in the following:—



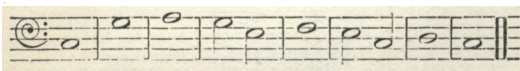
5. What are the roots of the following?



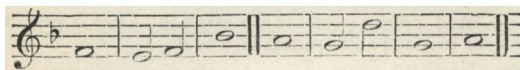
6. Add three parts to the following :—



7. Add a part, or parts, in any kind of counterpoint, to the following :—



8. Harmonize the following :—



9. Who were the principal English composers of the reign of Charles II.? State anything that you know about them.

PARIS EXHIBITION.

Now that the last month of the exhibition is begun, and doubtless many visitors will cross the channel, it will be well to give, not a complete account, for that would be impossible, but a sketch of some of the most salient points in the foreign sections. The group of applied art, or, to quote the terms of the classification, of "the material and applications of the liberal arts," presents perhaps the most interest for the readers of the *Journal*. France makes a magnificent show in this group; the two exhibits which preface it in the grand vestibule are both essentially typical of her progress in the most important of all the divisions of the group. One consists of a collection of the works issued by the great publishing firm of Hachette and Co., the other of the printed productions of Messrs. Maine et Fils, of Tours. The former firm issues the largest number of works of any house in France; the latter, perhaps the finest specimens of printing, and especially of large books and illustrated works. The beauty of the typography alone demands great attention, while the richness of illustration shows the great progress that has been made in this respect. In one case as in the other the prolific genius of Gustave Doré is everywhere apparent; but he is not alone, and the style of illustration generally exhibits a notable advance since 1855. Behind these two collections are two grand compartments, which, together with the avenue between them, are filled with a mass of prints, chromo-lithographs, and illustrated books, most of them of admirable execution; the number of illustrated works of science, technical as well as popular, is surprising. The collections of stationery, and of artists' materials and office requisites, are very large, and show as much progress as the typographical department.

One of the most remarkable collections, however, is that of designs, sketches, and models for manufactures. Here our neighbours exhibit an amount of ingenuity which is unrivalled; and if the taste is not always severe, at any rate it is almost universally agreeable. In the designs we find a large number of copies of Chinese and Japanese work, but, generally, they are adaptations, and not mere copies, and exhibit a remarkable amount of artistic ingenuity. Amongst the designs and models are many finished works; and a collection of decorated faïences by Messrs. Collinot deserves special notice; it consists of a pavilion formed entirely of ornamental glazed pottery, paved with encaustic tiles, and filled with fine pieces of decorated ware, large and small, and admirable in body, glaze, and colour. The scientific section which adjoins the preceding is scarcely less im-

portant, with this exception, that it contains many contributions which were exhibited in 1855, and which are therefore really out of date here; but the collection of scientific and philosophical instruments headed by Ruhmkorff, and of microscopic preparations and anatomical models, is magnificent. The collection of musical instruments opposite the two *salles* above-named, and that of surgical instruments and medical and sanitary apparatus beyond, are both of them unequalled whether in extent or importance. The last department of this group is occupied by the materials of education, also an admirable show, but, unlike the others, crowded and ill-lighted.

The other states follow in order around the circle of the building, and all, or nearly all, show good educational collections, musical instruments, photographs, and stationery. Hesse, Baden, Wurtemberg, and Bavaria are remarkable for their collections of drawing and mechanical models.

Austria makes a good show in nearly all the sections of this group, but especially for geological maps and books, charts, and collections for general and technical education.

Greece emulates England, and exhibits copies of her newspapers and periodical journals, amounting to just 100 in number.

Russia here, as elsewhere, takes a highly honourable place; she has a fine collection of photographs, representing public buildings, and a most interesting series of views in the Caucasian mountains; a very remarkable series of figures of peasants and others, and also of animals in terra cotta; a good collection of surgical instruments; and also of stationery, plain and decorative.

Italy exhibits in this group one of the most important inventions in the Exhibition, that of M. Brunetti, for preserving animal tissues, to which a grand prize has been awarded; healthy and diseased lungs, and other parts of the body are exhibited in a dried form, and but little shrivelled, with the appearance of paper pulp or leather, and of a consistency permitting it to be dissected in any manner with ease, and even cut into the thinnest laminae for microscopic examination or exhibition. She has also a good show of educational books, models, and collections of photographs, including enamelled specimens.

In the United States section are several pianos of excellent quality, and cabinet organs; books, maps, and photographs. South America, India, Canada, and the other British colonies, all exhibit photographs; many, being views of local scenery, are highly interesting.

Great Britain completes the group with the finest collection of periodical and other printed works in the Exhibition, not perhaps in an artistic, but in a social, moral, and commercial point of view; if some finer specimens of typography can be shown by other countries, no state could exhibit such a mass of healthy, sound, well-printed literature, produced within the short period of twelve months. The English portion of this group includes admirable examples of the application of art to the decoration of ceramic and metal work, and although we cannot claim to be first in ornamental art, we may well congratulate ourselves on the progress which we have made since the great display in 1851 taught us our deficiencies.

THE LAMBETH LIBRARY.

The following letters have been addressed to the editor of *The Times* :—

SIR,—A short time ago you suggested that the Lambeth library, abandoned by the Archbishop of Canterbury and starved by the Ecclesiastical Commissioners, should be transferred to the British Museum, and your suggestion has been generally echoed by the press. But before it is adopted allow me to make another one, which is that the library be made a public one for that part of the metropolis.

Paris has its four public libraries supported by the State, besides the Bibliothèque Impériale. Then there is the library of the Hotel de Ville, with its 70,000 volumes of the histories of French towns; the Arsenal library, with its 6,000 MS. and 200,000 volumes of early poets and Italian literature; the library of the Conservatoire des Arts et Metiers, with its 20,000 volumes on science and art; the St. Geneviève library, with its 180,000 volumes of divinity, classics, &c. In all, there are upwards of 18 public libraries in Paris, all accessible to every student, whereas London, with its greater extent and population, has only the British Museum and the Educational Library at South Kensington to which the public has a right of access.

Let us have a public library at Lambeth based upon the existing one, the oldest public library, it is said, in England, hallowed with innumerable associations. There are already on the spot the books and manuscripts; the Ecclesiastical Commissioners offer £150 a year, which could, perhaps, be augmented; Parliament, which would have to pay something for the transfer to the British Museum, might make its annual contribution; and Lambeth itself, through the Public Libraries Act, might raise a rate of a half-penny in the pound, like Manchester, Birmingham, &c., and thus would be provided a sufficient sum for management and increase, and a great public good effected.

There is Nixon's noble dining-room waiting for a reading-room, and there are the gardens for a public promenade when the Archbishop is out of town. If we allow the books to be sent away, the old historical buildings and their associations will soon be swept away and the ground leased on building leases for 99 years. It would be a sacrilegious act, which I believe even household suffrage is too conservative to permit, but if allowed would lead, I believe, to abolishing the Archbishop of Canterbury himself.—I am, &c.,

HENRY COLE.

Paris, September 24.

SIR,—Every one who is acquainted with the constitution and peculiar character of the Lambeth Library, or has seen the two catalogues of the more interesting portions of it, printed by that profound scholar and excellent man, Dr. Maitland, who was for so many years the keeper of that library and the friend of Archbishop Howley, must agree with Mr. Cole in deprecating its removal to the British Museum, and in advocating its preservation as a separate library.

There is a homely English proverb, full of practical wisdom, which bids us "Not to put all our eggs in the same basket." It is one which we should do well to bear in mind on the present occasion.

Inflammatory as may be the subject of many books, books themselves, fortunately, do not readily consume. Yet who can contemplate without a shudder the possibility of a fire breaking out in our great National Library; and who would not, in the face of so great a calamity, which Heaven forefend, rejoice that the Lambeth Library had not added to such a holocaust?

But, agreeing with Mr. Cole that the library should not be removed, I cannot agree with him in intrusting it to the halfpenny rate-payers of Lambeth, and so, perchance, making its maintenance the subject of a party vote, and its dispersion the consequence of some ultra-radical majority.

Did the parish of St. Martin come forward with a halfpenny rate to save Archbishop Tenison's Library? Does my memory mislead me, or am I right in believing that in one of the north-western parishes of the metropolis a library which had been collected by a rate, by subscriptions, by contributions from learned societies and men of letters, and by the liberality of some of our great publishers, was eventually sold, because a rate for its maintenance could not be carried?

Lambeth Library ought to be preserved, not only as an additional library in the metropolis, but as a monu-

ment of the liberality of the prelates by whom it was founded, and of the learning of the Whartons and Maitlands to whose custody it has been intrusted; and it ought to be maintained by a Parliamentary grant. A thousand a year would cover—I believe, more than cover—all the necessary expenses, including the binding and repair of the books and the salary of the librarian. The librarianship would be a literary Blue Riband for one of those ripe and good scholars of which our Church can boast so many, the recent holder of that office being, of course, its first recipient.

What Chancellor of the Exchequer would hesitate to propose, what House of Commons, reformed or unreformed, would hesitate to vote, that sum for the maintenance in the beautiful hall, which the munificence of Dr. Howley fitted up for its reception, of a library as unique in its character as it is rich in its contents?

I am, &c.,

WILLIAM J. THOMS.

SIR,—Mr. Thoms's concurrence in my suggestion to preserve Lambeth Library on its present site is satisfactory as coming from such a scholar and archaeologist. But in ascribing to me a notion of intrusting it to all the accidents of parochial management he has misunderstood my letter. If the Ecclesiastical Commissioners and Parliament respectively contributed portions of the funds, I think it may be assumed that some proper public responsibility would be established for the administration of them. The parish of Lambeth might come in aid with funds to provide for additions, and to secure the general throwing open of the library and its use by the parishioners. If Lambeth be not advanced enough to do this, *adit questio*, so far as it is concerned. The public moral obligation of preserving and utilising this, the oldest library in London, remains just the same on the Ecclesiastical Commissioners, on the Archbishop of Canterbury, and, I hope it will be admitted, on Parliament. I venture to hope that the present Archbishop will, in respect of this venerable institution, prove himself to be a worthy successor of Archbishop Juxon.

I am, &c.,

HENRY COLE.

Oct. 1, 1867.

BRITISH ASSOCIATION, 1867.

THE IRON SHIPBUILDING OF DUNDEE.

MR. HENRY GOURLAY read the following paper on this subject:—

Shipbuilding has long been an important branch of industry in Dundee, and even at the beginning of the present century the number of vessels built for coasting and over-sea trade was considerable. All these vessels were, of course, built of timber, and about the year 1823 were all propelled by sails. The number and size of the vessels gradually increased, until about the year 1856, when wooden shipbuilding in Dundee may be said to have reached its maximum. In that year Messrs. Alexander Stephen and Son built the *Eastern Monarch*. This vessel measured 1,848 tons, n.m., was classed 14 years A1 in Lloyds' Register, and at the time was one of the largest, if not the largest, vessel afloat of this high class. At this time there were six firms which built timber vessels, whereas at present there are only two which do so exclusively, one other firm building timber and composite vessels. There is also a considerable number of wooden vessels built on the Tay at Perth, Newburgh, and Tayport. It is now nearly thirty years since iron shipbuilding was introduced in Dundee. In the year 1838 Messrs. James Carmichael and Co. built an iron paddle steamer (for, as we shall immediately see, steam shipbuilding had been commenced some time prior to this). This vessel was named the *Caledonia*, and was intended for the river traffic between Dundee and Perth. The same firm also built a small iron schooner. These

vessels attracted considerable attention at the time, there being very few iron vessels then afloat. After building these two vessels, Messrs. Carmichael discontinued iron shipbuilding, but it was again taken up in 1840 by Mr. Peter Borrie, who built several iron paddle steamers. Unfortunately, Mr. Borrie was not commercially successful, and so was compelled to abandon the trade. Between the years 1842 and 1854, no iron ships were built in Dundee, and during this interval other ports had commenced, and were carrying on the trade with vigour, so that, although Dundee was early in the field, this advantage was lost.

In 1854, Messrs. Gourlay, Brothers, and Co., commenced to build vessels of iron, and since that time the trade has steadily increased, there being now two firms which build entirely with iron, and one which uses iron for the frame-work. The largest iron vessel yet built in Dundee is named the *Dundee*, and measures 1,295 tons register. It was built by Messrs. Gourlay, Brothers, and Co., is owned by Messrs. Gilroy, Brothers, and Co., of this town, and is employed to carry jute from Calcutta.

As a proof of the severe treatment which iron vessels are capable of sustaining, without permanent injury, the following facts may be here mentioned:—On the 18th November, 1865, the screw steamer *London* was proceeding down the river Tay when she was run into and cut down to the bilge by the steamer *Harvest Queen*. The opening made in the *London's* side was about twelve feet long at the gunwale, and tapered gradually down to the bilge—the gunwale and 'tween deck stringers being entirely carried away. In about a quarter of an hour the vessel sank in deep water, where only a small portion of her deck forward was dry at low water in spring-tides. In this position she remained for twelve months, during which time she endured the violence of several severe storms. The gap in the *London's* side was about fifty feet from the stern, and nearly the whole of this length was unsupported—the vessel resting amidships on a hard bottom, so that she lay for twelve months exposed to the fury of the sea, with nearly fifty feet of her stern overhanging, and this with only one side of the vessel left entire. The *London* was raised last December by her builders, and is now in as seaworthy a condition as the day she was launched. The *Harvest Queen* struck the *London* with her stern, and was consequently not so much injured; but she had to be run ashore on bad ground, and, being heavily laden with coal, she parted amidships when the tide left her; however, she was raised by Mr. Petrie, of Newport, and is now also as seaworthy as ever.

Steam shipbuilding has also been long carried on in Dundee. We find that in 1823 there was a paddle vessel, named the *Hero*, built for the passenger traffic between Dundee and Perth; and in 1834 Mr. Thomas Adamson, in conjunction with Mr. Peter Borrie, energetically took up this branch of the trade, and built a number of paddle steamers, one of which was the unfortunate *Forfarshire*, that was lost on the Fern Islands, and to save whose passengers Grace Darling made her heroic efforts. All these steamers were built of timber; but in the year 1840 Mr. Borrie, as has been already mentioned, commenced to construct iron steamers. The first screw steamer built in Dundee was launched from the building-yard of Mr. John Brown, in 1851. This vessel, named the *Corvee*, measured 395 tons b.m., and was fitted with a pair of geared engines of 70-horse power. After Mr. Borrie gave up business, steam shipbuilding was not carried on to any great extent until the year 1854, when it was again revived by Messrs. Gourlay, Brothers, who have carried it on since that time, and have turned out a large number of steamers, many of which have been vessels of considerable value, fitted for carrying mails and passengers, and such have been supplied to several of the leading steamship companies.

About ten years ago, a sailing vessel named the *Tay* was fitted with a pair of screw engines, and sent to the

whale fishing—her owners thinking that the aid of steam would be a great advantage. Their anticipations proved to be correct, and the following year there were two screw whalers built specially for the trade; since that time a great number of such vessels have been turned out by Messrs. Alexander Stephen and Sons, both for this and other ports. The employment of sailing vessels for the seal and whale fishing has now been entirely abandoned in Dundee. These screw whalers have all been built of timber, and are strongly fortified to enable them to endure the severe pressure of ice to which they are often exposed; they are only fitted with auxiliary power, and are fully rigged for sailing. A difference of opinion prevails as to whether iron is a suitable material for building vessels intended for this trade. It is urged, on the one hand, that iron vessels have been already tried, and found to be unreliable amongst ice; that iron is untrustworthy when exposed to low temperatures, especially when it has to endure the impact of masses of ice. On the other hand, it is asserted that the iron vessels which were sent to the fishery some years ago were not built for the trade, and were quite unsuitable for it; that a good quality of iron is little affected by low temperatures; and that, by adding slightly to the thickness of the plating, the strength of the vessel to resist the impact of ice may be greatly increased; and that, as whaling vessels are supplied with large tanks to contain the cargo of oil, these tanks may be fitted to form independent compartments, so that if a piece of the ice should penetrate the iron skin, the result will merely be that one of the tanks will be filled with water.

Until the year 1865 all the vessels built in Dundee had been constructed either of wood or iron, but at this time Messrs. Stephen commenced to build ships with a combination of these materials. Such vessels are known as composite, and, as built by Messrs. Stephen, are classed 15 years A 1 in Lloyd's register. The frames, keelson, stringers, tie-plates, and beams are of iron, and the planking, keel, stem and stern post, are of timber. The planking is secured to the frames with yellow metal bolts, and is also sheathed with yellow metal, the same as wooden vessels, so that such vessels do not foul, as iron ones are apt to do, on long voyages. Shipbuilding in all its branches is at present in a rather depressed condition in Dundee, as indeed it is all over the world; but this state of things is only temporary, and the trade will no doubt soon revive.

In order to give a correct idea of the shipbuilding carried on in Dundee, I will show what tonnage has been built during the last six years by the five firms now engaged in it, and shortly describe what each firm has done. Messrs. Alex. Stephen and Son build composite and wooden vessels; the composite ships are generally of considerable tonnage, varying from 600 to 1,250 tons b.m.; the wooden vessels built by this firm have of late years been nearly confined to screw whalers. Messrs. Stephen, since January, 1861, have launched 3,272 tons of wooden sailing vessels; 5,621 tons of screw whalers, fitted with 600 horse-power; 1,847 tons of composite sailing ships; and have on the stocks one screw whaler of 520 tons, and one composite sailing ship of 601 tons b.m.—in all, 11,861 tons b.m., and 600 horse-power. The average number of hands employed by this firm is about 220. Messrs. Brown and Simpson are now principally engaged in building iron vessels. Before 1865 Mr. Brown built wooden vessels, and altogether there have been launched since 1861, 2,551 tons of wooden sailing ships; 2,491 tons of iron sailing ships; and 63 tons of iron steamers; and there is on hand 1,066 tons of iron sailing vessels—in all, 6,108 tons. The number of men employed is about 200. The Tay Shipbuilding Company build wooden vessels, and since 1861 have launched 4,502 of such, and have on the stocks one vessel of 350 tons—in all, 4,852 tons. The number of men employed is about one hundred and twenty. The Dundee Shipbuilding Company also build wooden vessels. They

have launched 3,348 tons since 1861, and have one vessel of 398 tons on hand; build vessels up to 610 tons. The average number of men employed is about seventy. Messrs. Gourlay, Brothers, and Co. build iron vessels. They have been principally engaged in building steamers, and since January, 1861, have launched 2,511 tons of sailing vessels; 11,293 tons of iron steamers, fitted with 2,480 horse-power; and have on hand two steamers measuring 1,130 tons collectively—total tonnage, 14,934 tons. The average number of men employed in the building yard is about 300. The following table will show the tonnage of the various kinds of vessels that have been launched in Dundee since the year 1861, and also the tonnage on the stocks in June of this year:—

| | | | |
|-----------------------------------------------------|--------|--------|--------|
| Wooden sailing vessels launched since 1861 | 13,673 | | |
| On the stocks, June, 1867 | 748 | | |
| | | 14,421 | |
| Wooden steamers launched since 1861 | 5,621 | | |
| On the stocks, June, 1867 | 520 | | |
| | | 6,141 | |
| Total tonnage of wooden vessels | | | 20,562 |
| Iron sailing vessels launched since 1861 | 5,002 | | |
| On the stocks, June, 1867 | 1,066 | | |
| | | 6,068 | |
| Iron steamers launched since 1861 | 11,356 | | |
| On the stocks, June, 1867 | 1,130 | | |
| | | 12,486 | |
| Total tonnage of iron vessels .. | | | 18,554 |
| Composite sailing vessels launched since 1861 | 1,847 | | |
| On the stocks, June, 1867 | 601 | | |
| | | 2,448 | |
| Total tonnage of composite vessels | | | 2,448 |
| Total tons | | | 41,564 |

The value of the vessels represented by this tonnage is about £627,000 sterling, or £104,500 annually, exclusive of the machinery fitted on board the steamers. The average number of men and boys employed in the ship-building yards is about 910. The materials of which the vessels are constructed are generally brought from a distance. The iron comes from the north of England and Glasgow; the wood—except the oak, which is grown in the neighbourhood—from the Baltic, America, and India. The chains and anchors are generally manufactured in Newcastle, but the sailcloth and cordage are produced in Dundee. The cost of the carriage of iron and coal is a disadvantage that the Dundee shipbuilder labours under; but it is not a very serious obstacle, as these materials can be carried at a cheaper rate by water, and there are advantages to compensate, so that there is no reason why shipbuilding may not be largely carried on in Dundee. Iron as a material for shipbuilding is here, as elsewhere, to a large extent taking the place of wood, for I find that in 1853 there were no iron ships building in Dundee, but for the last six years the tonnage of the iron vessels has not been far short of the wooden ones, whilst there is nearly double the tonnage of iron vessels on hand than there is of wooden ones.

TECHNICAL EDUCATION.—HOROLOGICAL SCHOOLS IN FRANCE.

A few years ago the watch and clock trade in France had fallen to a low ebb; the home production was small, and the importation considerable; great efforts have, however, been made at Besançon, and all along the Swiss frontier, in the arrondissements of Moreau and Pontarlier, the district of Montbéliard, and the mountains of the Doubs. Large factories in the two latter districts are employed in the making of detached pieces of the

mechanism only. The number of watches produced at Besançon is about 300,000 a year, gold and silver; this is equal to about four-fifths of the whole consumption of France. The Besançon trade has increased very rapidly; in 1845 the total make was just over 54,000; in 1855 it had risen to 142,000; and in 1865 it was just under 300,000. The effect of this increased activity is shown in the imports, which have declined in the same proportion as the home manufacture has increased; in 1855 the number of watches received from abroad was 200,000, but in 1865 it had fallen to 45,454. There exists at Besançon a school of horology, towards the expenses of which the municipal authorities subscribe £800 a year. Another school was established in the year 1863-4 at Cluses, in the arrondissement of Bonneville, on the road from Geneva to Chamounix. The object of this school, as stated in the Imperial decree, is to form educated and able workmen for the different branches of the trade, and to secure the necessary instruction for those who intend to become manufacturers, finishers, or repairers. The course of instruction must not exceed three years, and the teaching, which is theoretical as well as practical, is gratuitous. The theoretical instruction includes French grammar, writing, mechanical drawing, arithmetic, geometry, and the elements of algebra, physics, and cosmography. The practical instruction is given in four workshops, devoted severally to the making of the various parts, in the rough-cutting pinions, making dials and finishing the various kinds of escape-ments, putting together, casing and regulating, and, lastly, accessory operations, such as wheel-cutting, jewelling, and case making and finishing.

The lads are boarded out of doors, but under the surveillance of the school, and the cost, including board, lodging, and washing, is £21 per annum, paid quarterly in advance. A portion of the pupils are maintained by the state and by the local authorities, the rest by their own families. Each pupil has to deposit the sum of one pound to defray any loss of materials which may occur by his own fault.

The director, with the advice of a council, gives a certificate to each pupil who deserves one, indicating the degree of his proficiency, and stating the special operations to which he has devoted himself while in the school.

Boys are not admitted until they have passed the age of fourteen, but no maximum seems to be fixed in this respect. Each pupil is required to be able to read, write, and cypher, and know something of the metrical system of weights and measures, before admission; and all candidates are examined by a schoolmaster appointed by the sub-prefect of the place to which he belongs; the list of those who have passed their examination is placed in the hands of the prefect, who nominates those who are to enter the school.

In the school the pupils wear a grey linen blouse, and out of doors either that or a blue tunic, like the pupils of the Paris schools, with a uniform *kepi*. Each pupil has to find his own books and tools; the list of the latter, however, is not long—a turning tool, pair of pliers, compasses, calipers, hammer, oilstone, blow-pipe, two gravers, half-a-dozen files, and two whalebone bows, with a dozen gut strings. A collection of finished watches, movements, and detached pieces produced at the school may be seen at the Paris Exhibition.

Manufactures.

IMPROVEMENTS IN RAILWAY CARRIAGES.—The French railway companies are making considerable improvements in their carriages. The Paris, Lyons, and Mediterranean line has just put to work a very large number of first-class carriages, six hundred it is said, of an improved model; these carriages are larger and more comfortable than usual, and the company has very considerably had the arms which divide the places made

so that they may be easily removed, and thus allow passengers to lie at full length upon the seats when the carriages are not too full. The Eastern line has done what was still more desirable—namely, started a number of third-class carriages on an improved model; they are much better ventilated than the old ones, and the seats are divided by arms; unfortunately, however, as these arms are fixed, the third-class passengers of the Eastern Company will now be deprived of the chance of the recumbent stretch which they had before. A shed in the French quarter of the grounds of the Paris Exhibition contains an admirable collection, not only of railway carriages, but all kinds of fittings and materials for the same, and well deserves a visit.

PAPER MANUFACTURE IN RUSSIA.—This industry is being very rapidly developed in Russia. In 1845 there were only 158 paper mills, producing paper to the value of £450,000. In 1864 there were 184 mills, with 13,000 workmen, and their production was returned at the value of £900,000. There are paper manufactories in all the governments of the empire except Archangel, Astrakan, Vitepsk, Grodno, Kovno, Minsk, Vornegne, Ssaratoff, Poltawa, Kherson, Yethakerinoslan, Bessarabia, and the Tauride. The government of St. Petersburg stands at the head of the manufacture, having 30 mills and 2,200 workmen, producing one-third of the whole quantity made in the empire. Moscow comes next with 24 mills; Skalonga and Viatka next with 15 and 11 respectively.

MANUFACTURES IN NORWAY.—The spinning mills and manufactories of woven goods employ about 2,500 workmen. Sixteen mills prepare about 2,000,000 kilogrammes of cotton yarn, and there are 11 manufactories of cottons, 3 of sail-cloths, and 3 of woollen cloths; the last work up 440,000 lbs. of wool annually. There are in Norway 44 rope yards, employing 360 workmen; 78 tobacco manufactories, employing 800 workmen, and exporting 5,300 lbs. of manufactured tobacco; 3 establishments for making matches; 328 tile-making works, employing 2,080 workmen, and producing annually 40,000,000 tiles and bricks; 25 machine works, occupying 1,250 workmen; 3 large and 4 small paper mills, with 200 workmen, producing about 550,000 lbs. of paper of all kinds; 8 manufactories of pianos, which turn out 150 instruments a year; 6 glass-works, employing about 300 workmen; and 6 establishments for wood distillation; about 7½ millions of litres of spirits are made, employing 800 workmen; 96 breweries, with 616 workmen, furnish for export annually 100 hectolitres of beer, sent specially to Sweden, Denmark, and Hamburg; 5 million kilogrammes of barley are yearly made into malt. The tanneries produce 2,800,000 lbs. of leather.

Commerce.

TRADE OF THE SANDWICH ISLANDS.—Among the articles exported from these islands in 1866 were:—Sugar, from the port of Honolulu, 17,729,161 lbs.; molasses, 851,795 gallons; flour, rice, 438,367 lbs.; coffee, 93,682 lbs., against 263,705 lbs. in 1865; salt, 738 tons; cotton, 22,289 lbs.; goat skins, 76,115 bales, against 144,085 bales in 1865; leather, 282,305 lbs.; tallow, 159,731 lbs.; whale oil, 91,182 gallons; whalebone, 56,840 lbs. Other articles, such as silk, mats, wood for cabinet work, &c., also furnish articles of exportation. Among other articles of commerce, the silky fibres of a fern, under the name of “pulu,” are shipped to California to the amount of 212,026 lbs. The line of steamers between China and San Francisco touches at Honolulu, and Hawaiian vessels carry on a regular service with Bremen.

AGRICULTURAL PROSPECTS IN ITALY.—The vintage in Southern Italy is by this time about finished, and was begun at least ten days earlier than usual, in consequence of the extreme dryness of the season, which has burnt the grapes in many places. In Sicily and the Neapolitan

provinces the new wine is not only abundant but contains an unusual amount of spirit. In Tuscany the grapes are not quite so plentiful as in the south, but on the other hand they are not so much scorched. In Piedmont and the provinces of the Emilia the vintage is most satisfactory; the rice also promises to yield a most abundant harvest. The cotton crops are not very promising, excepting those where there is a plentiful supply and a good system of irrigation. Cattle are scarce, partly owing to the scarcity of grain from want of irrigation, and partly to exportation, which has almost occasioned uneasiness in Northern Italy; on the other hand, the epizootia has destroyed a good many in Sicily and in the Neapolitan provinces. An abundant crop of olives is expected. In general the harvest has been good, as is proved by the prices of cereals.

Colonies.

NATAL COAL AND IRON.—The *Natal Mercury* makes the following observations:—“It is to be hoped that the colonists will not allow the question of coal-development to sleep. Coal and iron are, notoriously, the most certain staple of a country's prosperity. They have carved out a position of commercial pre-eminence for Great Britain, and so completely do the advanced statesmen of the day recognise them as the primary sources of her national greatness, that her decadence is pre-dated from the time when her coal measures become exhausted. The possession of these motive powers of industry makes America independent of the world. Coal supplies the heat by which iron can be manipulated into countless forms of utility and ornament. Energetically turned to account, they can hardly fail to secure wealth and prosperity. To men whose lives have been spent in the manufacturing districts of England, and who have day by day seen around them the wonders wrought, not only industrially, but socially, by means of coal and iron, the apparent apathy existing here, in regard to these two resources, is incomprehensible. Here, say they, you have within your grasp the sources of wealth; here is abundant scope for the employment of industry, and yet you repine about your poverty, and cry out for work. To such persons no effort would be too great—no measure too bold—in order to turn these elements to valuable account. They deride the prudent objections of those who urge the rashness, if not the folly, of incurring heavy liabilities in the shape of capital borrowed to work the enterprise. If coal and iron abound, as they are said to do, the speculation is simply the soundest form of investment. You have a vast market for your supplies. India, Mauritius, and Aden, would find at your port the nearest source of supply. Nor is this all. Were coal obtainable at cheap rates here, a change would be created in maritime commerce. Large steamers would be constructed to round the Cape, and to coal here, and the costly and troublesome overland route would be partially abandoned in favour of the old course of trade. Steamvessels, moreover, are coming into fashion even for long sea routes in preference to sailing ships, as carriers of cargo. Two or three lines now ply to China, and call at Mauritius; sometimes at Algoa Bay. Were coal obtainable here, this would be their port of call; while steam traffic would soon engross a large part of the vast East Indian trade. As to a market, therefore, the future is certain. This is the substance of the arguments lately set forth by Mr. Donovan, Dr. Mann, and others, in the columns of English journals, with reference to our coal fields. There is much irresistible truth in them. We are neglecting the right use of the natural agencies conferred upon us by Providence, for the attainment of our true position as a community. While we deplore the misfortunes that beset us, and spend hope after hope in quest of better times, might we not with advantage consider whether by organisation, investigation, or any

other kind of effort, it may not be possible to second the endeavours of people in England, and supply them, at any rate, with better materials of action than what they have now. Government might do its part in obtaining a practical and precise report upon the Newcastle coal measures. But a more immediate line of effectual action lies open to private and interested persons. Why should not the holders of land in those parts, and, indeed, all colonists who would be directly or indirectly benefited by the results of action—and who would not?—combine and subscribe, so as to obtain a large shipment, not less than 100 tons, or, better still, an entire cargo, and send it home as proof positive that the coal is there. The expense would be considerable—perhaps £1,000, but the sale of the coal would partly reimburse the subscribers, while the good done to the colony and to individual interests would be incalculable. Would it not be wise policy on the part of institutions largely interested in landed securities, to liberally aid, if not to initiate, such a movement. Such a shipment as we have indicated would alone enable us to ascertain the market value of our coal deposits, and to arrive at a positive understanding of the quality and kind of the coal.” As to the question of iron, the same writer says:—“Native usage and tradition in Africa all point to the feasibility of iron-working being largely carried on here. In Australia the aborigines use spears armed with fish bones. Here, and throughout the continent, spears and other implements made of iron have from time immemorial been in use among the natives. From those savages we may learn wisdom in this matter. Dr. Livingstone says that in Zambesi the tribes can supply themselves with iron more easily than it can be imported. He says “the natives consider English iron rotten, and will not use it. I brought home some of the hoes which Sekeleth gave me to purchase a canoe, and some others obtained in Quillimane, and they had been found of such good quality that a friend of mine in Birmingham has made an Enfield rifle of them.” On sending a specimen of this iron to a blacksmith, “he pronounced it strongly like Swedish or Russian, and added that when chilled it had the properties of steel.” An equally valuable and high-classed metal is obtained among the Fans on the West Coast, from iron-stone smelted in the rudest manner by wood fuel heaped on to bits of ore, and kept burning for several days. Du Chailu says that this iron is so tenacious that the natives prefer it to any from Birmingham or America, and by its own excellence it “protects” itself. Indeed, as a rule, we believe that locally manufactured iron would be likely to be more durable than imported, which is too often made bad expressly “for exportation,” on the principle that anything will do for the colonies. But whether this be so or not, the folly of neglecting these twin sources of wealth, lying as they do under our feet, cannot be over-estimated. Coal and iron will make Natal, and confer upon us prosperity far faster and more effectually—with a more quietly formed solidity, and with less immediate demoralisation—than would all the gold mines of Golconda. In discussing the expediency of forming a railway, let us then bear in mind that such a line would give instant activity to those wonderful but latent resources. What we lack in population is made up by the wide-spread existence of these two levers of progress. For not in Natal merely, but beyond our borders, along the eastern slopes of the northern Drakensberg, and throughout the Transvaal Republic iron almost everywhere, coal frequently, are known to be laid up—as if by Providential design—for the use and enrichment of our enterprising people. It seems as if the destiny marked out for South Africa is, when the times are ripe, and the necessity has matured, to become the iron-foundry and fuel-market of the southern world. Shall we, in the hour of need, grasp this distinction or let it slip?”

PRECIOUS STONES AT THE CAPE OF GOOD HOPE.—A Cape paper states that people are prospecting in all directions in the neighbourhood of Colesberg in search of diamonds. A number of those precious stones have already been found, some of them of considerable value. The first diamond was picked up by a little girl at Hope-town. Her father is a labourer, on the farm of Mr. Schalk van Niekerk. She took the diamond to her mother, and the latter, thinking it only a pretty stone, returned it to the child to play with. Niekerk happened to see it glitter and offered to buy it of the girl, but she gave it to him, saying, laughingly, who ever heard of selling a stone. He took it, and it proved to be a diamond worth £500. Garnets have just been found in considerable numbers at the Cape. The copper miners in Amapondaland are meeting with much encouragement. Oil stones have just been found in the Ganubie river. Amber has also been found in the Colesberg district, also formations containing phosphorus and quicksilver. It is also reported on good authority that some gentlemen in seeking for diamonds have come upon a lode of silver and lead ore.

COPPER IN NATAL.—An important mineralogical discovery has recently been made in this colony. It may be remembered that the mines at Griqualand owed their discovery to the rude green paint used by the natives in decorating their faces. The attention of Mr. Shepstone, Secretary for Native Affairs, was attracted by this circumstance to a similar incident, noticed by him 18 years ago within the boundaries of Natal. In course of time he succeeded in identifying the exact locality, and Mr. Warne, a practical miner of 30 years' experience, has recently returned from a nine days' prospecting trip, bringing with him about three cwt. of metalliferous rock, consisting chiefly of carbonate of copper mixed with quartz and friable clay. These specimens are poor, being from near the surface, but they give every promise of a richer yield beneath. These are taken from a vein eight feet wide, running from north-east to south-west, and probably extending for some distance, as similar indications have been found at other places. The most important feature of the discovery, however, is its nearness to the coast, the lode not being more than seven miles from the sea, and little more than that distance in the tidal rise of the Umkomazi, where the river becomes navigable and accessible by small vessels. A township has already been laid out at this little harbour, which is only 30 miles south of Durban. The distance of the lode by land is only about 27 miles, 13 of which is a dead level. The land all round is set apart for the use of the natives, and Government will, therefore, have the disposal of the affair in their own hands. In all probability these mineral indications are but precursors of further discoveries. They occur in a range of hills which run parallel with the coast from the Amapondaland, through Natal into Zululand. At the southern extremity copper of fine quality exists, and it is now found at a higher point near the Ilovo. Government has placed £1,000 on the estimates for next year in aid of mineralogical explorations.

Notes.

PRICE OF LAND IN PARIS.—The *Moniteur* gives the following as the price of land for building in several of the new streets of Paris:—Place du Théâtre Français, equal to £48 the square mètre; Rues Turbigo and Réaumur, £34 16s.; Rues Lafitte and St. Georges, £33; Chaussée d'Antin and Rue Ollivier, £28; Rue Lafayette, £42; Rue Taitbout, £40; Rue de Rennes (continued), near Mont Parnasse, £6.

NEW METHOD OF HORSE-SHOEING.—The Paris correspondent of the *Telegraph* speaks of a new shoeing process which, he says, is coming into general use there. Instead of the wide and heavy plate hitherto fixed under the horse's foot, M. Charlier, the inventor, fastens a narrow iron band

in a rebate, paired round the lower external rim of the hoof. The latter is thus furnished with a resisting border, by which it is protected against wear, allowing at the same time all the other parts of the sole to keep their natural hold on the ground, and thus to preserve the normal form and constitution of the organ. This *périplantaire* mode of shoeing, as it is called, is simple enough. The new shoe is about two-thirds lighter than the old one, which proves a great relief to the animals, besides preserving them from most of the usual diseases and accidents of the foot. M. Charlier says that in the natural state, so long as the side of the hoof does not split, the whole member wears very well; therefore the problem to be solved merely consisted in preventing the hoof from splitting, and in preserving the rest of the foot. So he simply gives it an artificial border, stronger than the natural one, but without compressing or damaging the foot. The new shoe appears to make the horse particularly sure-footed, and to answer as well for large as for small horses. There remains the question of cost. The iron employed must be of the best quality, but as the new shoe requires from a half to two-thirds less material than the old one, it comes to the same. It appears that, after a fair trial, the Voitures de Paris Company have purchased the right of shoeing all their horses on this plan, and it has also been tested by one thousand omnibus horses.

SCHOLASTIC REGISTRATION ASSOCIATION.—At the last annual meeting of this association it was resolved to make the association the basis of a periodical "Educational Congress," in order to afford educators, and the friends of education generally, the opportunity of exchanging views on questions relating to the educational wants of the country. In pursuance of this resolution, a Congress is announced to be held at Birmingham on Wednesday, the 13th of November, when the following subjects will be discussed:—"How far will the proposed Scholastic Registration Act tend to raise the standard of education throughout the country, and promote the interests and efficiency of the scholastic profession?"—"How far is the science of education capable of development by the more specific training of educators, and by such measures as the institution of a special faculty of education in the universities of Great Britain and Ireland?"—"What means can be adopted for training teachers for upper and middle-class schools?" A large and influential local committee has been formed, including George Dixon, Esq., M.P.; and all those who are interested in the advancement of education and the prosperity of the profession are invited to attend. Full information respecting the proceedings of the congress may be obtained from the hon. secretary, Barrow Rule, Esq., Aldershot.

THE CITY COMPANIES AND TECHNICAL EDUCATION.—In a speech made on the occasion of the recent election of the Lord Mayor, Mr. John Jones, a member of the Livery, said:—"The ancient Livery companies of the city of London might still be made, as of old, germinating centres, and the only proper medium by which improved culture could be given to the artisans of England. Their ancient *prestige* might be revived if the Lord Mayor would but call upon them to act up to their original objects, to see that apprentices in the various handicrafts were well taught, and that the knowledge of discoveries in science and the mechanical arts was well disseminated among the artisans of that great city. For ages in those civic companies there had been arrangements for settling such disputes in trade as had culminated, for the lack of such arrangements, in the revolting disclosures which had been made at Sheffield, and the Lord Mayor for the time being, by putting himself at the head of such a system as was known in France by the name of *Conseils des Prud'hommes*, might settle the due proportions of labour and capital in their joint action and endeavours whenever those may be in dispute."

Patents.

From Commissioners of Patents' Journal, September 27th.

GRANTS OF PROVISIONAL PROTECTION.

Aëronautical apparatus—1982—T. Craddock.
Aëronautical apparatus—2504—J. K. Smythies.
Asthma, &c., preparation for relieving—2524—S. Cassan.
Bale fasteners—2512—L. B. Pothier.
Canisters—2516—J. S. Henderson and J. Macintosh.
Carriages, &c.—2532—J. Cockshoot, jun.
Cartridges—2502—G. W. Howard.
Cask stands—2554—J. Turnock.
Chenille, manufacturing—2590—P. R. Couchoud.
Cigar bunches, pressing and shaping—2514—G. Cope.
Compasses—2592—F. A. Paget.
Corsets—2576—L. M. Prewitt.
Engraving machine—2218—W. Snell.
Fabrics and yarns, finishing—2490—A. Leigh.
Faggots—2620—T. Stevenson.
Filters—2564—J. Rae.
Fire-escapes and ladders—2586—C. Oates.
Fire-grates—2494—E. Y. Robbins.
Fringes—2560—J. Holliday.
Fuel economizer—2584—J. Perrin.
Hoops, &c., rolling—2588—W. Brown.
Hops, &c., extracting liquid from—2540—H. Woods.
Hydrogen—2548—C. E. Brooman.
Ice, artificial—2544—E. J. C. Welch.
Jewellery—2594—R. Lowe and J. Taylor.
Ladders—2498—G. Smith.
Lead refining—1515—O. Wassermann and J. H. Herbst.
Life-boats, &c., launching—2534—J. B. Rogers.
Liquids, heating, &c.—2500—H. G. Graham.
Looms—2552—J. Marsden.
Marble slabs, &c., polishing, &c.—2572—A. M. Clark.
Mattresses—2496—E. T. Archer.
Mineral oils, &c., for illuminating purposes—2606—G. Pickin.
Motive-power—2600—W. E. Newton.
Ores, &c., washing—2568—C. Mather.
Organs—1954—J. Verreyt.
Purses, &c.—2574—F. Weintraud.
Railway brakes—2598—H. A. Bonneville.
Railway carriages, excluding dust from—2526—W. G. Creamer.
Railway fish-plates—2558—J. Dicken.
Reaping machines—2582—H. Stewart.
Roofs, covering—2612—W. Le Duc.
Rotary engines—2536—E. Hubner.
Scarfs, &c., securing—2616—S. Jay.
Sewing machines—2530—T. Cook.
Sewing machines, &c.—2610—W. J. Cunningham.
Ships—2528—A. M. Clark.
Sowing, hoeing, and raking apparatus—1452—J. Griffiths.
Stuffing-boxes, &c.—2556—J. Jordan.
Sulphur—2618—T. Bell.
Textile fabrics, extracting the colouring matter of indigo from—2546—W. E. Gedge.
Valves—2520—A. V. Newton.
Varnishes—2522—F. Versmann.
Velocipedes—1682—W. Tribe.
Warps—2518—E. Bernheim, G. W. Wilson, and E. Longworth.
Water wheels—2566—A. Kinton.
Waterproof materials, &c., substitute for—2604—J. Jeyes.
Winders—2542—R. W. Ewer.

PATENTS SEALED.

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| 941. R. Canham & F. W. Kreut. | 1046. H. A. Bonneville. |
| 955. H. A. Bonneville. | 1215. W. E. Newton. |
| 962. F. J. Manceaux. | 1281. F. Walton. |
| 969. J. Prentice. | 2167. C. E. Brooman. |
| 972. J. Lewis and G. Clark. | |

From Commissioners of Patents' Journal, October 1st.

PATENTS SEALED.

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|---------------------------------|--------------------------------------|
| 983. J. Mahler. | 1035. J. C. Roseaux. |
| 984. J. A. Moll. | 1054. C. F. Claus. |
| 994. A. S. Hallidie. | 1055. D. J. Fleetwood. |
| 997. F. Spence. | 1058. J. L. Davies. |
| 999. J. W. Scott. | 1088. W. Robertson and J. G. Orchar. |
| 1009. J. Ladley. | 1095. T. H. Head. |
| 1010. W. C. Webber. | 1104. C. G. Gillyatt. |
| 1011. E. Pilling and J. Harper. | 1205. T. Booth. |
| 1013. J. Petrie, jun. | 2226. W. R. Lake. |
| 1015. J. M. Kilner. | 2227. W. R. Lake. |
| 1016. B. Fowler and D. Greig. | 2238. J. Dewar. |
| 1027. W. Adair. | |
| 1034. W. P. Butchart. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

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|---------------------------------------------------|-----------------------|
| 2366. H. C. Symons. | 2410. W. H. Graveley. |
| 2420. E. Loysel. | 2501. G. H. Reay. |
| 2391. A. Cuthell. | 2378. G. Davies. |
| 2401. G. Lindsay. | 2396. G. Haseltine. |
| 2402. G. H. Harrington and H. and F. Y. Hewetson. | 2398. T. Bennett. |
| | 2418. P. Winton. |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

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|----------------------|------------------|
| 2322. J. H. Johnson. | 2363. A. Warner. |
| 2503. G. Davies. | |